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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Wei-Kuo Lee, et al.
Serial No.	:	09/311,480
Filing Date	:	May 13, 1999
For	:	CABLE SEMICONDUCTING SHIELD
Group Art Unit	:	1773
Examiner	:	Kruer, K

CERTIFICATION UNDER 37 CFR 1.8(a) and 1.10

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Date: June 3, 2002 Rosa Story

Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sirs:

APPEAL BRIEF UNDER 37 C.F.R. §1.192

This is an appeal from the final rejection of Claims 1-11 as stated in the Office Action mailed August 10, 2001. The Notice of Appeal was timely filed on April 3, 2002.

I. REAL PARTY IN INTEREST

The real party in interest is The Dow Chemical Company.

II. RELATED APPEALS AND INTERFERENCES

There are no related applications currently either under appeal or the subject of an interference proceeding.

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III. STATUS OF CLAIMS

All the claims of this application and their individual status are reported in the Appendix to this Appeal Brief. Claims 1-10 are on appeal. Claim 10 has been canceled by concurrent amendment. Appellants have presumed that this amendment will be entered.

IV. STATUS OF AMENDMENTS

All amendments have been entered. Claims 1, 3, and 7-10 were amended in the response filed on May 24, 2001. An amendment canceling Claim 10 has been filed concurrently with this Brief but has not been entered.

V. SUMMARY OF INVENTION

Appellants have invented a cable having a layer comprising polyethylene and/or polypropylene, carbon nanotubes, a conductive carbon black other than carbon nanotubes, and optionally, either an acrylonitrile /butadiene copolymer or a silicon rubber. The Appellants have also invented a semiconducting composition comprising polyethylene and/or polypropylene, carbon nanotubes, a conductive carbon black other than carbon nanotubes, and optionally, either an acrylonitrile /butadiene copolymer or a silicon rubber. The inventive cable/composition is shown to have unexpected synergistic effects in, *inter alia*, cleaner composition, lower filler loadings, higher production rules and better mechanical and electrical properties, such as more stable conductivity over time, lower viscosity, and volume resistivity which is stable to temperature cycling.

The cable is described more fully in (i) the Disclosure of the Invention from page 3, lines 1 through 18; (ii) the Description of the Preferred Embodiments from page 3, line 20 through page 16, line 18; and (iii) Examples 1-8 from page 16, line 20 through page 22, line 2.

VI. ISSUES

The issues on appeal is whether or not the following final rejections are in error:

A. Claims 1, 2 and 4 stand rejected under 35 U.S.C. §103(a) as being unpatentable over the Applicant's admissions in view of Nahass et al. (US 5,591,382).

B. Claims 1-4 stand rejected under 35 U.S.C. § 103 (a) as being unpatentable over Ongchin (US 4,286,023) in view of Nahass et al (US 5,591,382).

C. Claims 5-7 and 9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ongchin (US 4,286,023) in view of Nahass et al (US 5,591,392).

D. Claims 1, 6, 8 and 10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ongchin (US 4,286,023) in view of Silver et al. (US 4,317,001) and Nahass et al. (US 5,591,382).

E. Claims 1-4 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over EP 0420271A1 (a/k/a Burns et al.) in view of Nahass et al. (US 5,591,382).

F. Claims 5, 7, and 9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over EP 0420271A1 (a/k/a Burns et al.) in view of Nahass et al. (US 5,591,382).

VII. GROUPING OF CLAIMS

In the arguments below, Claims 1-4 and 6 stand together; 8 stands alone; Claims 5 and 7 stand together; and Claim 9 stands alone.

VIII. ARGUMENT

A. <u>Requirements for a *Prima Facia* Case of Obviousness</u>.

The Examiner's fundamental error in rejecting the claims on appeal is that he has failed to establish a *prima facie* case of obviousness.

> In rejecting claims under 35 U.S.C. §103, the examiner bears the initial burden of presenting a *prima facie* case of obviousness . . . 'A *prima facie* case of obviousness is established when the teachings from the prior art itself would appear to have suggested the claimed subject matter to a person of ordinary skill in the art . . .'" *In re Rijckaert*, 9 F.3d 1531, 1532, 28 U.S.P.Q.2d 1955, 1956 (Fed. Cir. 1993).

Specifically, to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. See *In re Royka*, 180 USPQ 580 (CCPA 1974). In addition, in order to establish a *prima facie* case of obviousness, the Examiner must show some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. *See*, *e.g.*, *In re Fine*, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). Furthermore, in leading one skilled in the art, the prior art must suggest to the ordinary skilled artisan that the combination should be carried out and would have a reasonable likelihood of success, viewed in the light of the prior art. *In re Dow Chemical Co*, 5 USPQ2d 1529, 1532 (Fed. Cir. 1988)(emphasis added). Indeed, both the suggestion and the expectation of success must be found in the prior art, not in the Applicant's disclosure. Id. Additionally, the Federal Circuit has stated that a reference should be considered in its entirety, with due consideration given to disclosures that diverge or teach away from the invention as well as disclosures which direct one skilled in the art to the invention. *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 227 U.S.P.Q. 657, 669 (Fed. Cir. 1985). The Appellants believe that the Examiner has failed to meet these standards and therefore has not established a *prima facie* case of obviousness.

B. Final Rejection

1. Claims 1, 2 and 4 were finally rejected under 35 U.S.C. §103(a) as obvious over applicants' admissions in view of Nahass et al. (USP 5,591,382).

In brief, the Examiner argues that the Applicants admit to the general construction of a typical electrical power cable, and the use of carbon black in the composition of the semiconducting shield layers. The Examiner acknowledges that the Applicants do not admit to the known use of carbon nanotubes as a substitute for carbon black, but the Examiner relies upon Nahass et al. for this teaching. Specifically, the Examiner argues that Nahass et al. teach that carbon fibrils have been used in place of carbon black in conductive compositions (although he does not argue that they have ever been used in semiconducting shield layers). Although the Examiner cites reasons to replace carbon black with carbon fibrils (e.g., less carbon fibril is

necessary to reach the same connectivity as carbon black and carbon fibrils enhance a polymer's tensile and flexural characteristics, the Examiner fails to cite any motivation within the prior art or Applicants' admissions for a combination of carbon black and carbon nanotubes.

Rather, the Examiner relies on the rationale of *In re Kerkhoven* where the courts held that "It is *prima facie* obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition to be used for the very same purpose...[T]he idea of combining them flows logically from their having been individually taught in the prior art." *In re Kerkhoven*, 626 F.2d. 846, 850, 205 USPQ 1069, 1072 (CCPA 1980). Specifically, the Examiner takes the position that both carbon black and carbon fibrils are useful as conductive fillers and therefore, it would have been obvious to blend carbon black and carbon fibrils in semiconductive shield compositions because less carbon fibril is needed to reach the desired conductivity and the carbon fibrils increase the polymer's tensile and flexural characteristics whereas carbon black is relatively cheap (see '382, col 1. line 36).

2. Claims 1-4 were finally rejected under 35 U.S.C. 103(a) as being unpatentable over Ongchin (US Patent 4,286,023) in view of Nahass et al. (US Patent 5,591,382). The Examiner states that Ongchin teaches an article of manufacture similar to Applicants' admissions comprising one or more strands of a conducting metal or alloy, a layer of semiconductive shielding, a layer of insulation and a layer of strippable semi-conductive composition. The strippable semiconductive material comprises (A) an ethylene copolymer selected from the group consisting of an ethylene-alkyl acrylate copolymer containing from about 15-45 wt% acrylate or ethylene vinyl acetate containing 15-60 wt% acetate, (B) a nitrile rubber containing 10-50 wt% acrylonitrile, (C) conductive carbon black, and (D) a peroxide crosslinking agent (col 2, lines 4-19). The ratio of (A) to (B) is between 9:1 to 1:9. The conductive carbon black is added in amounts of 10 to 150 parts per 100 parts of (A)+(B) (col 2, lines 19-26).

The Examiner admits that Ongchin does not teach that carbon fibrils (a.k.a. nanotubes) may be added to the semiconducting shield compositions. However, the Examiner relies on Nahass et al. and the rationale of *In re Kerkhoven* as stated in the previous final rejection.

3. Claims 5, 7, and 9 were finally rejected under 35 U.S.C. 103(a) as being unpatentable over Ongchin (US Patent 4,286,023) in view of Nahass et al. (US Patent 5,591,382), as applied to claims 1-4 above. The Examiner states that Ongchin in view of Nahass is relied upon as in rejection 2 above. However, the Examiner admits that neither reference teaches what relative amounts of carbon black and carbon fibrils that should be utilized together in a semiconducting shield composition. Rather, the Examiner relies on the rationale of *In re Aller* where the court held that "When the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller* 220, F.2d, 44, 456, 105 USPQ 233, 235 (CCPA 1955). Specifically, the Examiner states that, "it would have been obvious to utilize carbon black and carbon fibrils as conductive fillers in the same composition ... [and] it would have been obvious to optimize the amounts of carbon black and carbon fibrils in order to obtain the desired conductivity... [and] to vary the amount of carbon fibril with relation to the amount of carbon black in order to control the composition's tensile and flexural characteristics."

4. Claims 1, 6, 8 and 10 were finally rejected under 35 U.S.C. 103(a) as being unpatentable over Ongchin (Pat. No. 4,286,023) and in view of Silver et al. (Pat. No. 4,317,001) and Nahass et al. (Pat. No. 5,591,382). Ongchin is relied upon as stated in Rejection 2.

The Examiner admits that Ongchin does not teach that the insulation layer should comprise conductive filler. However, Silver teaches et al. an insulation layer for an electric cable wherein the insulation layer should have a volume resistivity of at least the order of 10^{10} ohm*cm. In order to obtain such a resistivity, conductive particles (e.g., carbon black) may be added to the insulating composition in amounts of less than 2.5 wt% (col 1, lines 18-41). Therefore, the Examiner takes the position that it would have been obvious to add low amounts of a conductive particle to the polyethylene insulative layer taught by Ongchin in order to obtain the desired volume resistivity.

The Examiner further admits that neither Ongchin nor Silver et al. teach that a blend of carbon black and carbon fibrils (a.k.a. nanotubes) should be utilized as the conductive filler

added to the insulating layer. Rather, the Examiner cites Nahass et al. and the rationale of *In re Kerkhoven* as in Rejection 1.

5. Claims 1-4 were finally rejected under 35 U.S.C. 103(a) as being unpatentable over EP 0420271A1 (a.k.a. Burns et al) in view of Nahass et al. (Pat. No. 5,591,382). The Examiner states that Burns et al. teaches an insulated electrical conductor comprising one or more strands of a conducting metal or alloy, a layer of semiconductive shielding, a layer of insulation and a layer of strippable semi-conductive composition (page 2, lines 6-12). The strippable semiconductive material comprises (A) 40-65 wt% an ethylene-vinyl acetate copolymer containing 27-45 wt% acetate, (B) 5-30 wt% nitrile rubber containing 25-55 wt% acrylonitrile, (C) 25-45 wt% conductive carbon black, and (D) a peroxide crosslinking agent (page 3, lines 15-22).

The Examiner admits that Burns et al. does not teach that carbon fibrils (a.k.a. nanotubes) may be added to the semiconducting shield compositions. Rather, the Examiner cites Nahass et al. and relies on the rationale of *In re Kerkhoven* as presented in the first rejection.

6. Claims 5, 7 and 9 were finally rejected under 35 U.S.C. 103(a) as being unpatentable over EP 0420271A1 (a.k.a. Burns et al.) in view of Nahass et al. (Pat. No. 5,591,382). Burns et al. in view of Nahass et al. is relied upon as in rejection 5 above. The Examiner admits that neither reference teaches that relative amounts of carbon black and carbon fibrils that should be utilized together in a semiconducting shield composition. However, the Examiner relies on the rationale of *In re Aller* to find that it would have been obvious to utilize carbon black and carbon fibrils as conductive fillers in the same composition and that it would have been obvious to optimize the amounts of carbon black and carbon fibrils in order to obtain the desired conductivity. Furthermore, the Examiner finds that it would have been obvious to one of ordinary skill in the art to vary the amount of carbon fibril with relation to the amount of carbon black in order to control the composition's tensile and flexural characteristics.

C. Remarks

The fundamental error underlying all the Examiner's rejections is a misreading of the teachings of Nahass et al. The Examiner apparently reads Nahass et al. to teach the use of carbon fibrils for the purpose of making compositions and cable shielding layers. However, Nahass et al. only discloses semiconducting compounds containing carbon fibrils for the purpose of making products such as automobile parts suitable for electrostatic painting, applicant housing components suitable for electrostatic painting, computer housings capable of EMI shielding and integrated circuitries and microelectronics packaging material suitable for static dissipation. See col 7, lines 47-51. This misreading of Nahass et al. afflicts all of the rejections as demonstrated in the errors below.

<u>Error 1</u> <u>The finding that Claims 1, 2 and 4 are obvious over Applicants' admissions in view of Nahass et al. is in error.</u>

First, nothing in Nahass et al. suggest the substitution of carbon nanotubes for carbon black in the preparation of semiconductor shield layers (and this assumes, *arguendo*, that carbon fibrils are synonymous with carbon nanotubes; this is not necessarily the case). More importantly, nothing in Nahass et al. suggest replacing same portion of the carbon black with carbon nanotubes in the preparation of a semiconductor shield layer. The difference is important, and this is shown in the examples of the present application.

First, note at page 18, Table 1, that Example 1 reports a composition of which 38 weight percent is carbon black. This table also reports in Example 4 in which the composition is 19 weight percent carbon black and 10 weight percent carbon nanotubes (for a total of 29 weight percent, which, for purposes of these examples, is approximately the same as 38 weight percent).

Second, note that Table 1 reports the viscosity for both of these compositions, and the viscosity of the Example 1 composition (all carbon black) is significantly higher at various shear rates than the viscosity of the Example 4 composition. The lower viscosity of Example 4 is important to a more facile in the processing of the composition into a semiconductor shield layer. This lower viscosity is even more striking when compared against the composition of Example 2 which contains 20 weight percent carbon nanotubes and 0 weight percent carbon black. The

viscosity of the composition of Example 2 is even greater across the various shear rates than that of the composition of Example 1.

Third, at page 20, Table 2 of the specification, the volume resistivities of the compositions of Examples 1-4 are reported. Note that not only is the volume resistivity of the composition of Example 4 comparable to that of the composition of Example 1, but it is much more stable over various thermal cycles than the volume resistivity of the Example 1 composition.

In response to the Applicants' arguments of May 24, 2001, the Examiner argued that Nahass et al. teach that nanotubes may be added to shielding for electrical components, and he cites column 1, lines 13-17 for support. This is error. Column 1, lines 13-17 read as follows:

> "Electrically conductive polymeric materials are desirable for many applications including the dissipation of electrostatic charge from parts, electrostatic spray painting and the shielding of electrical components to prevent transmission of electromagnetic waves."

However, the column continues with the following:

> "The primary method of increasing the electrical conductivity of polymers is to fill them with conductive additives such as metallic powders, metallic fibers, ionic conductive polymers, intrinsically conductive polymeric powders, e.g., polypyrrole, carbon fibers or carbon black. However, each of these approaches has some short-comings."

The Board is respectfully requested to note that not only does the word "nanotubes" not appear in these citations, but also the citations are clearly referring to the prior art (<u>not</u> the invention of Nahass et al.). Furthermore, "carbon fibers" are not "carbon fibrils". The former are discussed at column 1, lines 27-35 while the latter are described at column 2, lines 1-14. In the context of the Nahass et al. patent, the use of carbon fibers provides a conductive, static-dissipative or anti-static polymeric composition that is part of the prior art, while the use of carbon fibrils is part of the practice of their invention.

With this corrected understanding of the Nahass et al. patent, note that the Nahass et al. teaching is limited to the total substitution of carbon fibrils for any of the prior art additives, including carbon black, and not to a combination of a prior art additive and carbon fibrils. Not only is the Nahass et al. patent void of any teaching or suggestion of using carbon fibrils in combination with carbon black, but it is also suggestive that such combinations are undesirable. In this regard, the Examiner please note Nahass et al. at column 6, lines 48-55 in which techniques commonly used for dispersing carbon black within a polymer matrix are described as relatively ineffective for carbon fibrils. This suggests that blends of carbon black and carbon fibrils will not disperse in a desirable manner because while the method for dispersion will be effective for one component of the blend, it will not be for the other.

Just as importantly, the Nahass et al. patent is void of any incentive for one skilled in the art to blend carbon fibrils with other forms of carbon black. Not only does it suggest that such combinations would be difficult to work into the polymer matrix as noted above, but it does not provide any reason to move in this direction. The Examiner argues otherwise, but his reasons are not found in Nahass et al. Rather, the Examiner reads his reasons into Nahass et al. based upon the plethora of reasons cited by the applicants in their specification. For example, the applicants note the following at page 15 of their specification:

> "Where a combination of carbon nanotubes and another conductive carbon black is used, there is a lower cost; a cleaner composition; lower filler loadings; higher production rates; easier manufacturing and end use compounding; and better mechanical and electrical properties...Further there can be a synergistic effect between the carbon nanotubes and the conductive carbon blacks with respect to electrical properties, particularly conductivity, which is found to change less with time than systems containing only conductive carbon blacks, and it appears that the carbon nanotubes blends are more stable. There is also a benefit with respect to rheological properties in terms of lower shear viscosity, which can lower power needs in compounding; improve processibility; and lower extrusion temperatures resulting in better thermal stability. In the mixed system, volume resistivity is adequate at lower viscosities, and shows very small change with temperature, which is advantageous for lower dissipation factor."

None of these reasons are found in Nahass et al. for the very good and sufficient reason that Nahass et al. does not teach a blend of carbon nanotubes and another conductive carbon black.

Second, the Examiner does not allege any motivation within the prior art to form a cable having a layer comprising both carbon nanotubes and carbon black, but rather relies upon the rationale of *In re Kerkhoven*. However, the rationale *In re Kerkhoven* is not relevant in this case because the Examiner has not shown that the prior art references use the combined elements for the same purpose as the current invention, i.e., a semiconductor shield layer in a cable. In particular, the fibril containing composition of Nahass et al. are disclosed for the purpose of making products including automobile parts suitable for electro-static painting, appliance housing components suitable for electro-static painting, computer housings capable of EMI shielding, and integrated circuitries and micro-electronics packaging materials suitable for static dissipation. See col 7, lines 47-51. Thus, Nahass et al. does not disclose a composition used for the <u>same purpose</u> as the current invention. As such, the rationale *In re Kerkhoven* is not appropriate for the facts in the current case and the Examiner's reliance upon this rationale is in error.

Third, the Examiner's position that the reported results of applicant's Examples 5-8 are not unexpected over Nahass et al. is an overreach at best. Simply put, Nahass et al. do <u>not</u> report examples measuring stability of volume resistivity with temperature cycling and time as reported by the applicants in their Examples 5-8. The volume resistivity reported by Nahass et al. is measured <u>before</u> any temperature cycling and as such, what effect the carbon fibrils will have in this property is an unknown. Moreover, the examples of Nahass et al. are limited to 100 % carbon fibrils (blends of carbon black and fibrils are not reported). Accordingly, <u>no</u> basis is provided by Nahass et al. to predict the effect of a blend of carbon black and nanotubes on the stability of volume resistivity with temperature cycling and time of a polyethylene and/or polypropylene composition. In this context, the data of Examples 5-8, particularly Example 8, rebuts any *prima facie* case of obviousness that Nahass et al., alone or in combination with one or more of the other cited references, may make.

Error 2 <u>The finding that Claims 104 are obvious over Ongchin in view of Nahass et al. is in error.</u>

The teachings of Ongchin add little to the generic description (a/k/a the Applicants' admissions) of the Ongchin patent provided by the Applicants in the description on page 1, line 17 through page 2, line 10. Ongchin merely provides further details of a typical carbon black based semiconductive composition and a disclosure of the weight percent vinyl acetate monomer in the EVA.

However, like the Applicants' admissions, Ongchin does not teach the use of carbon fibrils in the preparation of semiconducting shields and as such, it can not teach blends of carbon fibrils with other carbon black materials in the preparation of semiconducting shields. Similarly, it can not provide any incentive to one of ordinary skill in the art to use a blend of carbon fibrils and other carbon black to prepare semiconducting shields. Moreover, the rationale of *In re Kerkhoven* is irrelevant to the facts of this case because Nahass et al. does not disclose a compound used for the <u>same purpose</u> as the currently claimed invention; as discussed in Error 2 above and incorporated herein by reference. Even more, neither Ongchin nor Nahass et al. disclose or suggest the excellent results obtained by the current invention which combines nanotubes and a carbon black other than nanotubes as shown in Examples 5-8. This basis of rejection is also error.

Error 3 <u>The finding that Claims 5, 7 and 9 are obvious over Ongchin in view of Nahass et al. is in error.</u>

a. Regarding Claims 5 and 7, these dependent claims are allowable as argued in Error 2. As the Examiner admits, Ongchin does not teach that carbon fibrils may be added to the semiconducting shield compositions. Also, and in contrast to the Examiner's position, Nahass et al. do not disclose the use of carbon fibrils in cable shielding. Rather, Nahass et al. teach the use of carbon fibrils in automobile parts suitable for electrostatic painting, appliance housing components suitable for electrostatic painting, computer housings and integrated circuitries and microelectronic packaging materials. Thus, Nahass et al. do not disclose the use of fibrils for the

same purpose as taught in the current invention, i.e., a shielded cable. Therefore, the rationale of *In re Kerkhoven* cited by the Examiner is inappropriate. Hence, the Examiner must show motivation to combine the references or to establish a *prima facie* case. However, the Examiner has stated no motivation found in the prior art for combining the two references. Therefore, this rejection is in error.

b. Regarding Claims 5, 7 and 9, the Examiner's reliance on *In re Aller* is also inappropriate. Even if, *arguendo*, Nahass et al. and Ongchin were properly combinable (which the Applicants strongly disagree), the *In re Aller* rule, that finding the optimum value of a variable in a known process is normally obvious, has two exceptions. See *In re Antoine,* 195 USPQ 6, 8-9 (CCPA 1977). The first exception is when the results obtained by optimizing the variable were exceptionally good and the second exception is when the parameter optimized was not identified by the prior art to be result-effective variable. *Id.* Indeed, for the Examiner to base an obviousness rejection on "obvious experimentation", such experimentation must come from "*within the teachings of the art*". *In re Waymouth and Koury*, 182 USPQ 290, 292 (CCPA 1974) (emphasis in original). In the current case, both exceptions apply.

First, as argued in Error 1, and incorporated herein by reference, there is no disclosure in either Nahass et al. or Ongchin to suggest the exceptionally good results obtained by the current invention. The Appellant particularly notes the unexpected stability of volume resistivity with temperature cycling and time achieved by the current invention. See Examples 5-8.

Second, the experimentation proposed by the Examiner does not come from "within the teachings of the art". In the current case, Nahass et al. teach the use of 100% carbon fibrils and Ongchin teaches the use of 100% carbon black. Neither reference teaches or suggests any experimentation with the ratio of nanotubes to carbon black (other than to teach use of one to the <u>exclusion</u> of the other). As such, any experimentation to optimize the carbon black and carbon fibrils weight percentage ranges does not come from *"within the teachings of the art"* as required by Waymouth and therefore cannot be obvious. Indeed, the Examiner's reference to the *In re Aller* rule in this case is essentially an improper obviousness rejection based on inherency. In order to base the rejection on elements not disclosed in the prior art, the Examiner must assume

that both the claim limitations and the specific claimed values for those limitations are inherent in the prior art. The Federal Circuit has already held that such assumptions are impermissible as "a retrospective view of inherency" which "is not a substitute for some teaching or suggestion supporting an obviousness rejection." *In re Rijckaert*, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993). As such, the Examiner's attempted *prima facie* case of obviousness fails.

Moreover, this rejection is even more tenuous than the previous rejection because it is that much more removed from the claimed invention. In other words, since these references do not teach or suggest or encourage semiconducting shields made from blends of carbon black and carbon nanotubes, then these references, alone or in combination with one another, can not even begin to teach or suggest the relative amounts of each to use in the shields.

Error 4 The finding that Claims 1, 6 and 8 are unpatentable over Ongchin in view of Silver et al. and Nahass et al. is in error.

a. Claim 10 has been canceled by concurrent amendment. Regarding Claims 1, 6 and 8, Silver et al. is added to the mix because it is argued to teach an insulation layer for an electrical cable having a stated volume resistivity, the layer comprising carbon black. However, as admitted by the Examiner, Silver et al. do not teach the use of carbon fibrils as a conductive filler or an insulating layer and as such, it offers no more to this basis of rejection than does Ongchin to the earlier basis of rejection. As such, the rejection is in error for the reasons stated in Error 2, which are herein incorporated by reference.

In addition, as argued in Error 1, and incorporated herein by reference, there is no disclosure in either Nahass et al. or Ongchin to suggest the exceptionally good results obtained by the current invention. The Appellant particularly notes the unexpected stability of volume resistivity with temperature cycling in time achieved by the current invention. See Examples 5-8.

b. Regarding Claims 6 and 8, given that nothing in Ongchin, Silver et al. or Nahass et al. teach the combination of carbon nanotubes in carbon black other than nanotubes in a semiconducting shielding layer of a cable, clearly there can be no teaching of a specific weight percentage of carbon nanotubes to use in combination with the carbon black. As such, the

Examiner must have improperly read the weight limitations of the current claims from Applicants/Appellants application into the prior art. This is error. Even if the Examiner should try to apply the rationale of *In re Aller* to this rejection, that rationale fails for the reasons argued in Error 3, incorporated herein by reference. Moreover, Claim 6 is of course, dependent from Claim 1 and is allowable for at least the reasons that Claim 1 is allowable.

Error 5 The finding that Claims 1-4 are unpatentable over Burns et al. in view of Nahass et al. is in error.

Burns et al. is argued to teach an insulated electrical conductor using one or more strands of a conducting metal or alloy with, among other things, a layer of semiconductive shielding. Here again, the Examiner has acknowledged that Burns et al. do not teach that carbon fibrils may be added to the semiconducting shield composition. As such, Burns et al. adds nothing more than that already taught by Ongchin or Silver et al. Here again, the Applicants/Appellants incorporate by reference all of the arguments made in Errors 2 and 4 above with respect to the teachings of Nahass et al., Ongchin, Silver et al. and Burns et al. If these previous rejections can not render obvious the claimed invention because they fail to teach or suggest a blend of carbon nanotubes with other carbon black, and the rationale of *In re Kerkhoven* is irrelevant to these facts, then this present rejection must also fail for the same reasons.

Error 6 The finding that Claims 5, 7 and 9 are unpatentable over Burns et al. in view of Nahass et al. is in error.

As noted in Error 5, Burns et al. add nothing more than that already taught by Ongchin and Silver et al. Also, as noted with the previous rejection of Claims 5, 7 and 9, in Error 3 this basis of rejection is even more removed from the claimed invention because not only does it fail to teach the blend of carbon nanotubes and other carbon black, but because of its very nature it must also fail to teach the required relative amounts of each.

a. Regarding Claims 5 and 7, these dependent claims are allowable as argued in Error 2, incorporated herein by reference. As the Examiner admits, Burns et al. does not teach that carbon fibrils may be added to the semiconducting shield compositions. Also, and in

contrast to the Examiner's position, Nahass et al. do not disclose the use of carbon fibrils in cable shielding. Rather, Nahass et al. teach the use of carbon fibrils in automobile parts suitable for electrostatic painting, appliance housing components suitable for electrostatic painting, computer housings and integrated circuitries and microelectronic packaging materials. Thus, Nahass et al. do not disclose the use of fibrils for the same purpose as taught in the current invention, i.e., a shielded cable. Therefore, the rationale of *In re Kerkhoven* cited by the Examiner is inappropriate. Hence, the Examiner must show motivation to combine the references or to establish a *prima facie* case. However, the Examiner has stated no motivation found in the prior art for combining the two references. Therefore, this rejection is in error.

b. Regarding Claims 5, 7 and 9, the Examiner's reliance on *In re Aller* is also inappropriate. Even if, *arguendo*, Nahass et al. and Burns et al. were properly combinable (which the Applicants strongly disagree), the *In re Aller* rule, that finding the optimum value of a variable in a known process is normally obvious, has two exceptions. See *In re Antoine,* 195 USPQ 6, 8-9 (CCPA 1977). The first exception is when the results obtained by optimizing the variable were exceptionally good and the second exception is when the parameter optimized was not identified by the prior art to be result-effective variable. *Id.* Indeed, for the Examiner to base an obviousness rejection on "obvious experimentation", such experimentation must come from "*within the teachings of the art*". *In re Waymouth and Koury*, 182 USPQ 290, 292 (CCPA 1974) (emphasis in original). In the current case, both exceptions apply.

First, as argued in Error 1, and incorporated herein by reference, there is no disclosure in either Nahass et al. or Burns et al. to suggest the exceptionally good results obtained by the current invention. The Appellant particularly notes the unexpected stability of volume resistivity with temperature cycling and time achieved by the current invention. See Examples 5-8.

Second, the experimentation proposed by the Examiner does not come from "within the teachings of the art". In the current case, Nahass et al. teach the use of 100% carbon fibrils and Burns et al. teaches the use of 100% carbon black. Neither reference teaches or suggests any experimentation with the ratio of nanotubes to carbon black (other than to teach use of one to the <u>exclusion</u> of the other). As such, any experimentation to optimize the carbon black and carbon

fibrils weight percentage ranges does not come from *"within the teachings of the art"* as required by Waymouth and therefore cannot be obvious. Indeed, the Examiner's reference to the *In re Aller* rule in this case is essentially an improper obviousness rejection based on inherency. In order to base the rejection on elements not disclosed in the prior art, the Examiner must assume that both the claim limitations and the specific claimed values for those limitations are inherent in the prior art. The Federal Circuit has already held that such assumptions are impermissible as "a retrospective view of inherency" which "is not a substitute for some teaching or suggestion supporting an obviousness rejection." *In re Rijckaert*, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993). As such, the Examiner's attempted *prima facie* case of obviousness fails.

IX. REQUEST

For the reasons stated in the above argument, Appellants believe that the claims on appeal comply with 35 U.S.C. §103(a), and they request that the final rejection of Claims 1-9 on appeal be reversed.

Respectfully submitted,

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Appendix

Claims

1. A cable comprising one or more electrical conductors, communications media or a core, each electrical conductor, communications medium, or core being surrounded by a layer comprising:

   (a) polyethylene; polypropylene; or mixtures thereof;

   (b) carbon nanotubes;

   (c) a conductive carbon black other than carbon nanotubes; and

   (d) optionally, (i) a copolymer of acrylonitrile and butadiene wherein the acrylonitrile is present in an amount of about 30 to about 60 percent by weight based on the weight of the copolymer, or (ii) a silicone rubber.

2. The cable defined in claim 1 wherein component (a) is a copolymer of ethylene and an unsaturated ester.

3. The cable defined in claim 2 wherein the unsaturated ester of the ethylene/unsaturated ester copolymer is selected from the group consisting of vinyl esters, acrylic acid esters, and methacrylic acid esters, and wherein the unsaturated ester is present in the ethylene/unsaturated ester copolymer in an amount of about 20 to about 55 percent by weight.

4. The cable defined in claim 1 wherein the layer is a semiconducting shield and component (b) is present in an amount of about 13 to about 100 parts by weight per 100 parts by weight of component (a).

5. The cable defined in claim 1 wherein the layer is a semiconducting shield and, for each 100 parts of component (a), component (b) is present in an amount of about 1 to about 35 parts by weight; component (c) is present in an amount of about 13 to about 100 parts by weight; and the weight ratio of component (b) to component (c) is about 0.1:1 to about 10:1.

6. The cable defined in claim 1 wherein the layer is an insulation layer and component (b) is present in an amount of about 0.01 to about 1 part by weight per 100 parts by weight of component (a).

7. A cable comprising one or more electrical conductors, communications media or a core, each electrical conductor, communications medium, or core being surrounded by a semiconducting shield layer comprising:

(a) an ethylene/unsaturated ester copolymer comprising an unsaturated ester selected from the group consisting of vinyl esters, acrylic acid esters, and methacrylic acid esters, and wherein the unsaturated ester is present in the ethylene/unsaturated ester copolymer in an amount of about 20 to about 55 percent by weight.

(b) carbon nanotubes;

(c) a conductive carbon black other than carbon nanotubes; and

(d) optionally, (i) a copolymer of acrylonitrile and butadiene wherein the acrylonitrile is present in an amount of about 30 to about 60 percent by weight based on the weight of the copolymer, or (ii) a silicone rubber.

with the proviso that, for each 100 parts of component (a), component (b) is present in an amount of about 2 to about 20 parts by weight; component (c) is present in an amount of about 15 to about 80 parts by weight; and the weight ratio of component (b) to component (c) is about 0.2:1 to about 8:1.

8. A cable comprising one or more electrical conductors, communications media or a core, each electrical conductor, communications medium, or core being surrounded by a layer comprising:

(a) polyethylene; polypropylene; or mixtures thereof;

(b) carbon nanotubes;

with the proviso that, for each 100 parts of component (a), component (b) is present in an amount of about 0.05 to about 0.3 part by weight; and

(c) a conductive carbon black other than carbon nanotubes.

9. A composition comprising:

(a) an ethylene/unsaturated ester copolymer comprising an unsaturated ester selected from the group consisting of vinyl esters, acrylic acid esters, and methacrylic acid esters, and wherein the unsaturated ester is present in the ethylene/unsaturated ester copolymer in an amount of about 20 to about 55 percent by weight.

(b) carbon nanotubes;

(c) a conductive carbon black other than carbon nanotubes; and

(d) optionally, (i) a copolymer of acrylonitrile and butadiene wherein the acrylonitrile is present in an amount of about 30 to about 60 percent by weight based on the weight of the copolymer, (ii) or a silicone rubber

with the proviso that, for each 100 parts of component (a), component (b) is present in an amount of about 1 to about 35 parts by weight; component (c) is present in an amount of about 13 to about 100 parts by weight; and the weight ratio of component (b) to component (c) is about 0.1:1 to about 10:1.

10. Canceled.